FIG.1

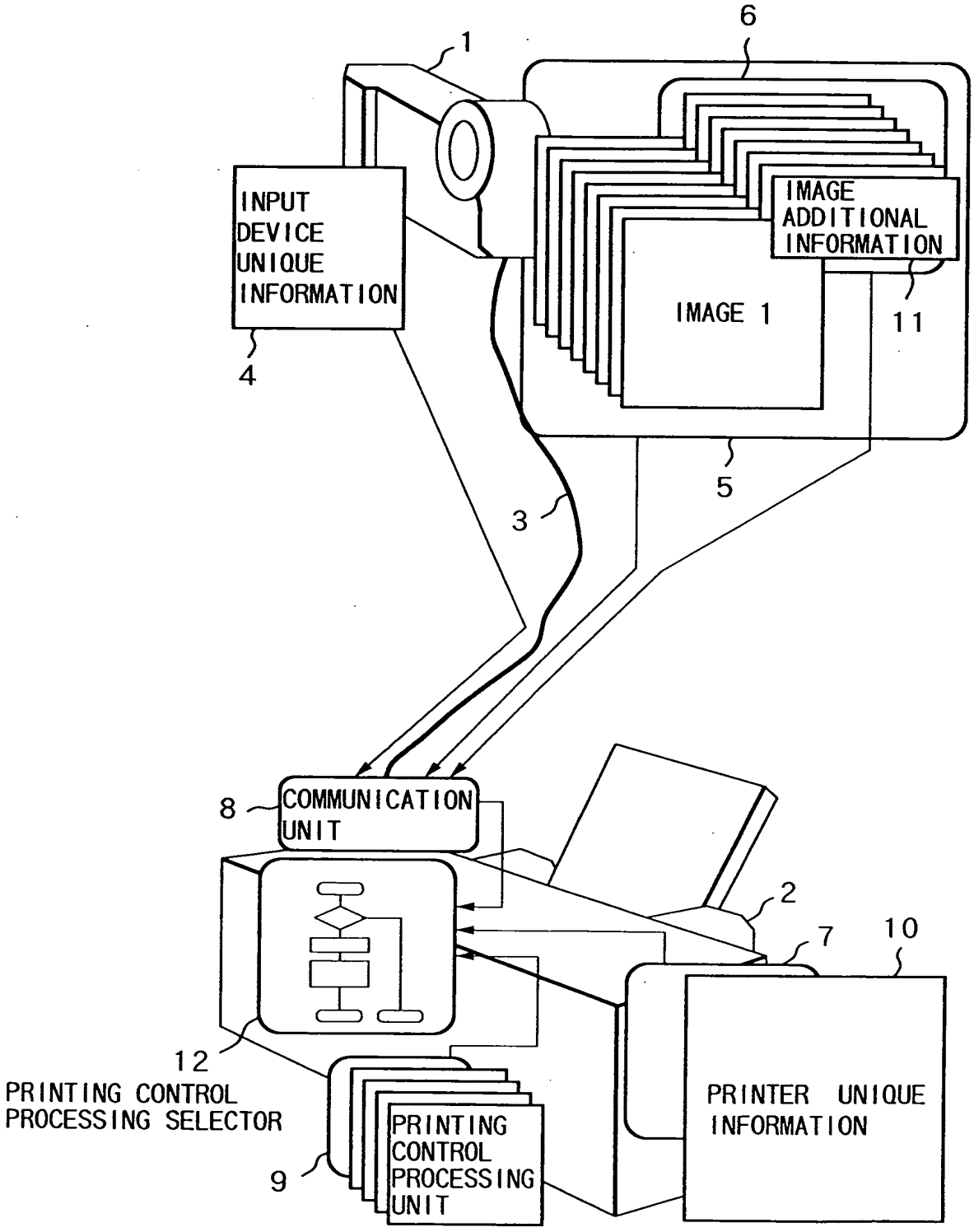

6
1
INPUT DEVICE UNIQUE INFORMATION
IMAGE ADDITIONAL INFORMATION
IMAGE 1
11
4
5
3
8
COMMUNICATION UNIT
2
7
10
12
PRINTING CONTROL PROCESSING SELECTOR
PRINTING CONTROL PROCESSING UNIT
9
PRINTER UNIQUE INFORMATION

FIG.2

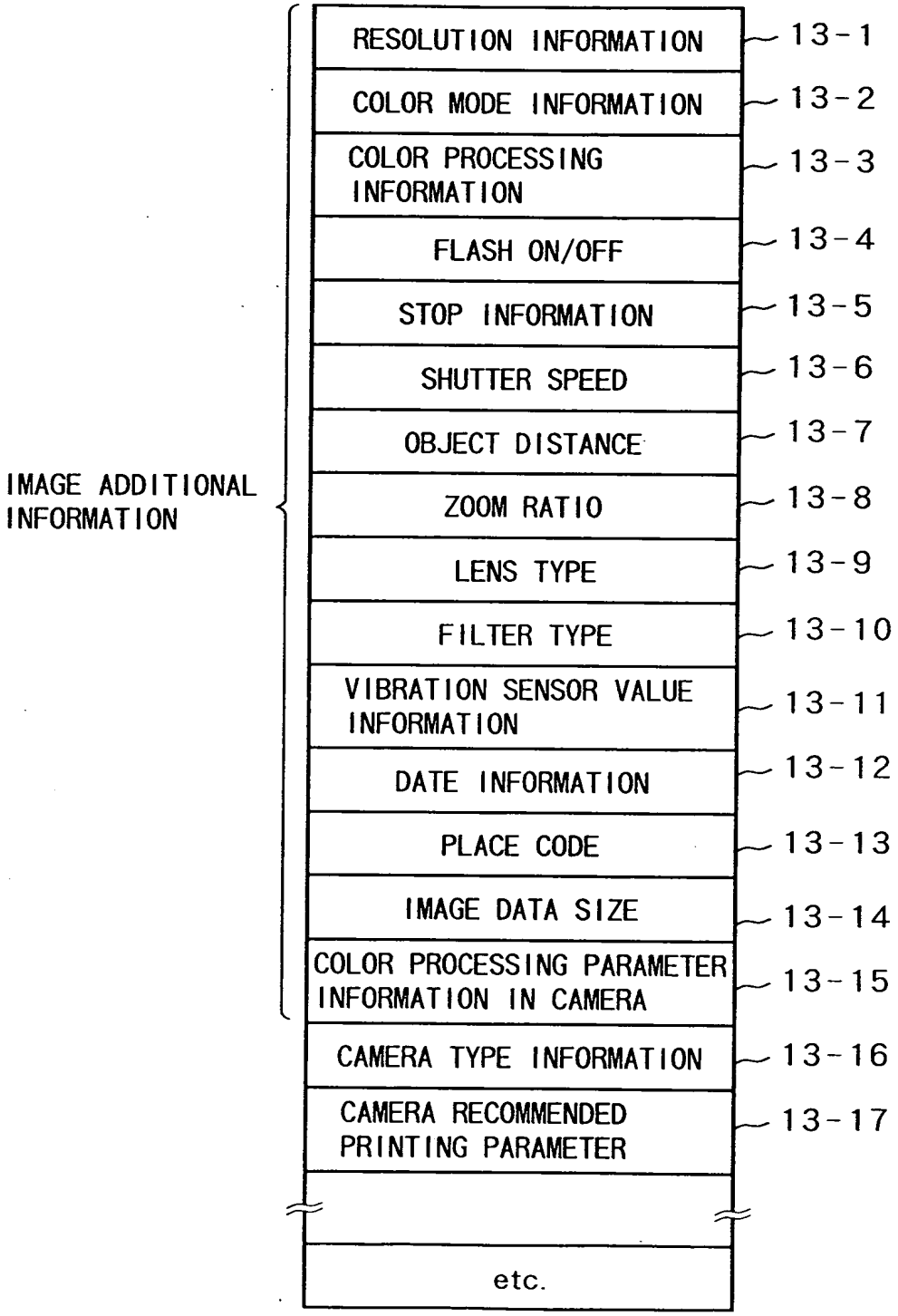


IMAGE ADDITIONAL INFORMATION
RESOLUTION INFORMATION
13-1
COLOR MODE INFORMATION
13-2
COLOR PROCESSING INFORMATION
13-3
FLASH ON/OFF
13-4
STOP INFORMATION
13-5
SHUTTER SPEED
13-6
OBJECT DISTANCE
13-7
ZOOM RATIO
13-8
LENS TYPE
13-9
FILTER TYPE
13-10
VIBRATION SENSOR VALUE INFORMATION
13-11
DATE INFORMATION
13-12
PLACE CODE
13-13
IMAGE DATA SIZE
13-14
COLOR PROCESSING PARAMETER INFORMATION IN CAMERA
13-15
CAMERA TYPE INFORMATION
13-16
CAMERA RECOMMENDED PRINTING PARAMETER
13-17
etc.

FIG.3

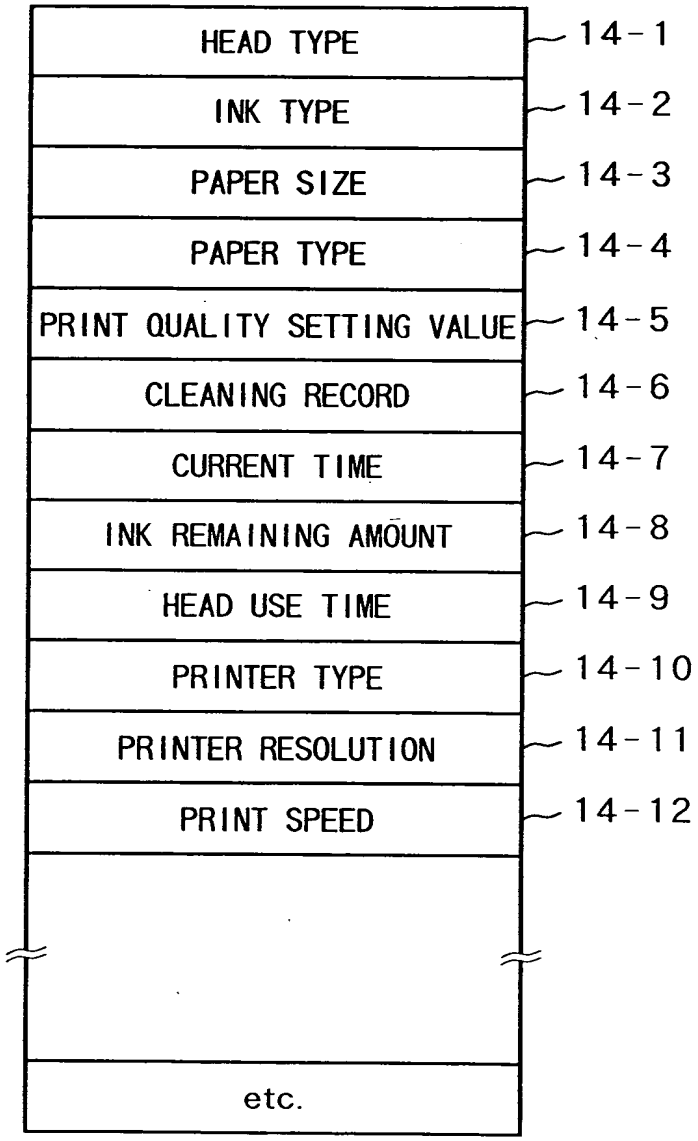

HEAD TYPE
14-1
INK TYPE
14-2
PAPER SIZE
14-3
PAPER TYPE
14-4
PRINT QUALITY SETTING VALUE
14-5
CLEANING RECORD
14-6
CURRENT TIME
14-7
INK REMAINING AMOUNT
14-8
HEAD USE TIME
14-9
PRINTER TYPE
14-10
PRINTER RESOLUTION
14-11
PRINT SPEED
14-12
etc.

FIG.4

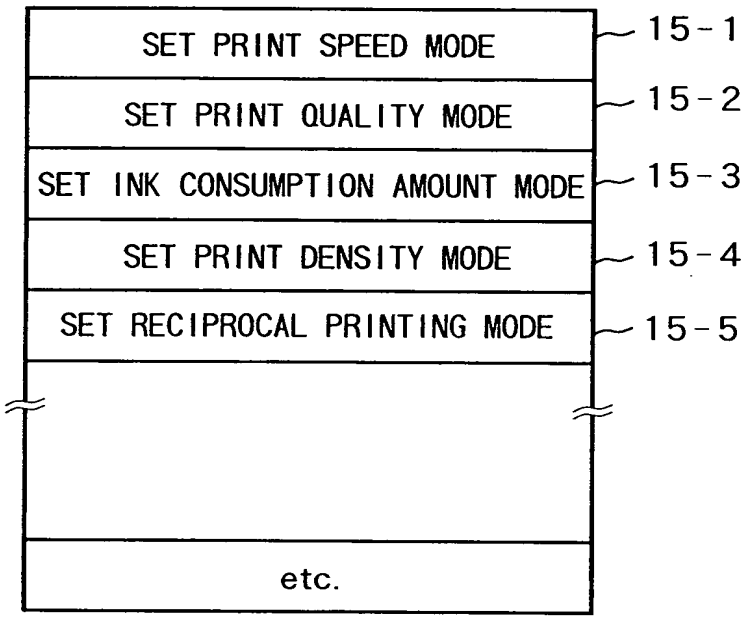

SET PRINT SPEED MODE
15-1
SET PRINT QUALITY MODE
15-2
SET INK CONSUMPTION AMOUNT MODE
15-3
SET PRINT DENSITY MODE
15-4
SET RECIPROCAL PRINTING MODE
15-5
etc.

FIG.5

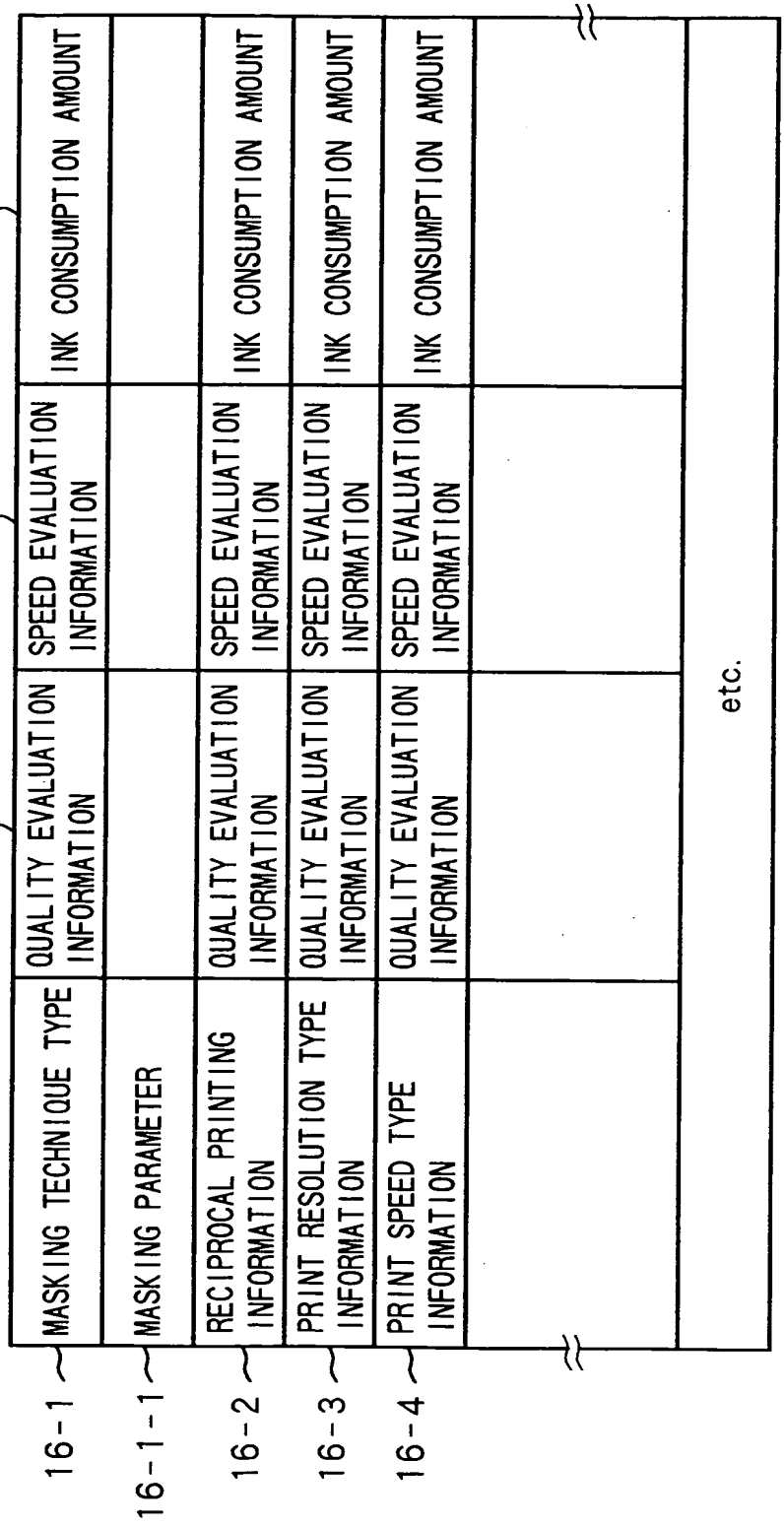

16-5
16-6
16-7
16-1
16-1-1
16-2
16-3
16-4
MASKING TECHNIQUE TYPE
QUALITY EVALUATION INFORMATION
SPEED EVALUATION INFORMATION
INK CONSUMPTION AMOUNT
MASKING PARAMETER
RECIPROCAL PRINTING INFORMATION
QUALITY EVALUATION INFORMATION
SPEED EVALUATION INFORMATION
INK CONSUMPTION AMOUNT
PRINT RESOLUTION TYPE INFORMATION
QUALITY EVALUATION INFORMATION
SPEED EVALUATION INFORMATION
INK CONSUMPTION AMOUNT
PRINT SPEED TYPE INFORMATION
QUALITY EVALUATION INFORMATION
SPEED EVALUATION INFORMATION
INK CONSUMPTION AMOUNT
etc.

FIG.6

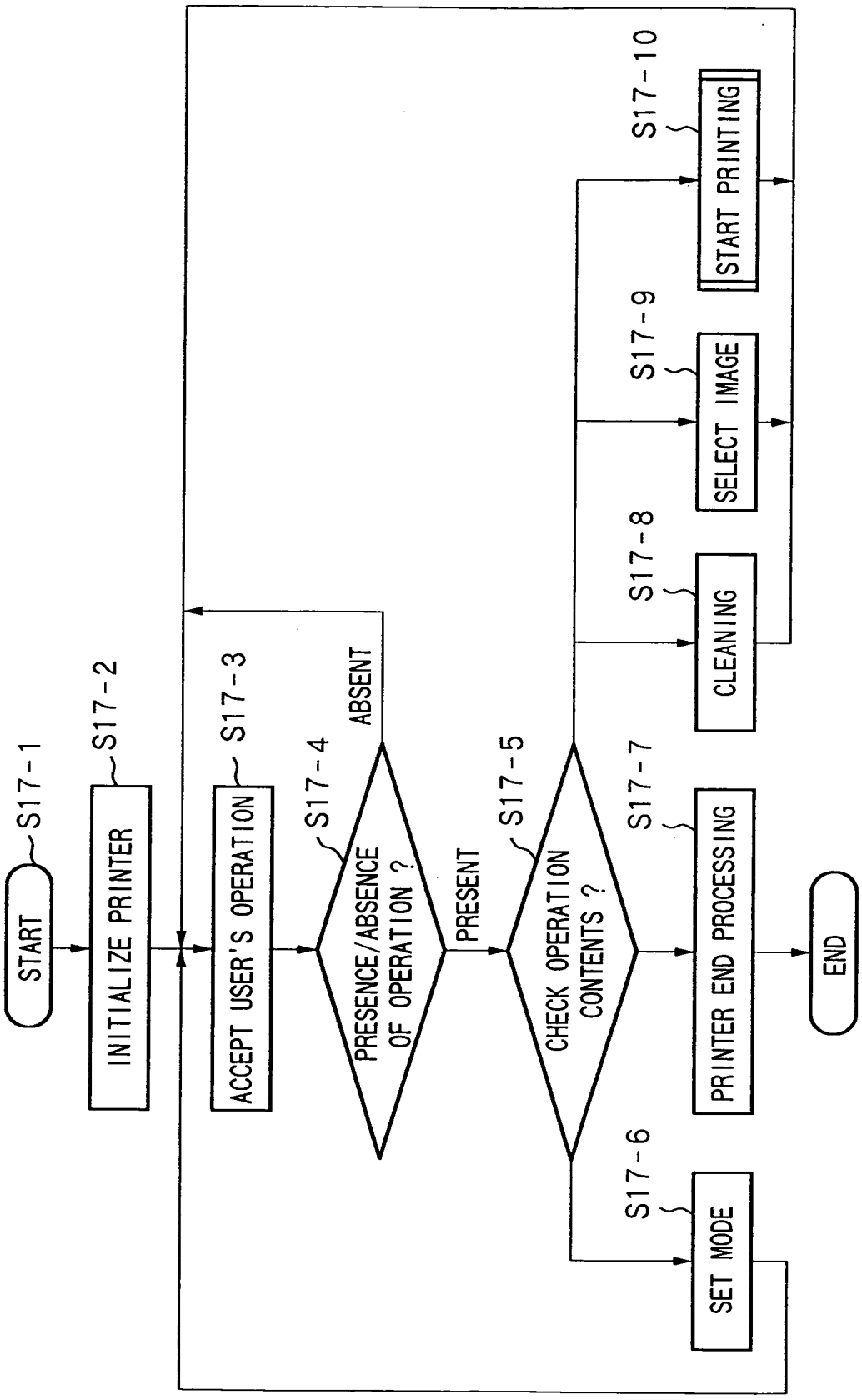

START
S17-1
INITIALIZE PRINTER
S17-2
ACCEPT USER'S OPERATION
S17-3
PRESENCE/ABSENCE OF OPERATION ?
S17-4
ABSENT
PRESENT
CHECK OPERATION CONTENTS ?
S17-5
SET MODE
S17-6
PRINTER END PROCESSING
S17-7
CLEANING
S17-8
SELECT IMAGE
S17-9
START PRINTING
S17-10
END

FIG.7

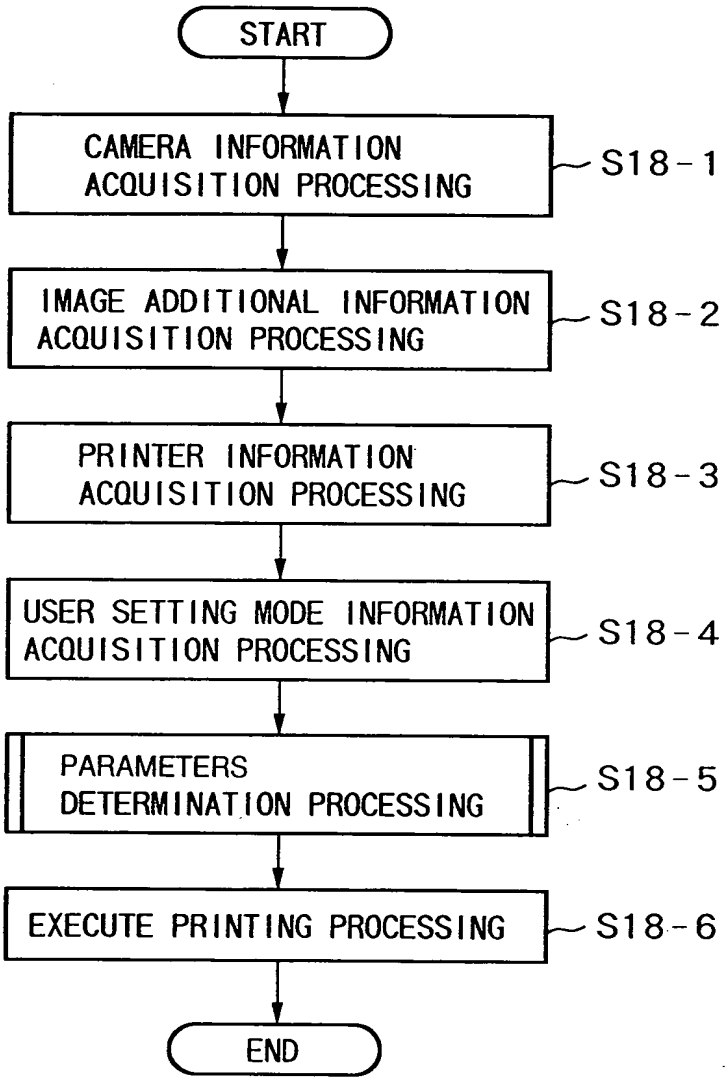

START
CAMERA INFORMATION ACQUISITION PROCESSING
S18-1
IMAGE ADDITIONAL INFORMATION ACQUISITION PROCESSING
S18-2
PRINTER INFORMATION ACQUISITION PROCESSING
S18-3
USER SETTING MODE INFORMATION ACQUISITION PROCESSING
S18-4
PARAMETERS DETERMINATION PROCESSING
S18-5
EXECUTE PRINTING PROCESSING
S18-6
END

FIG.8

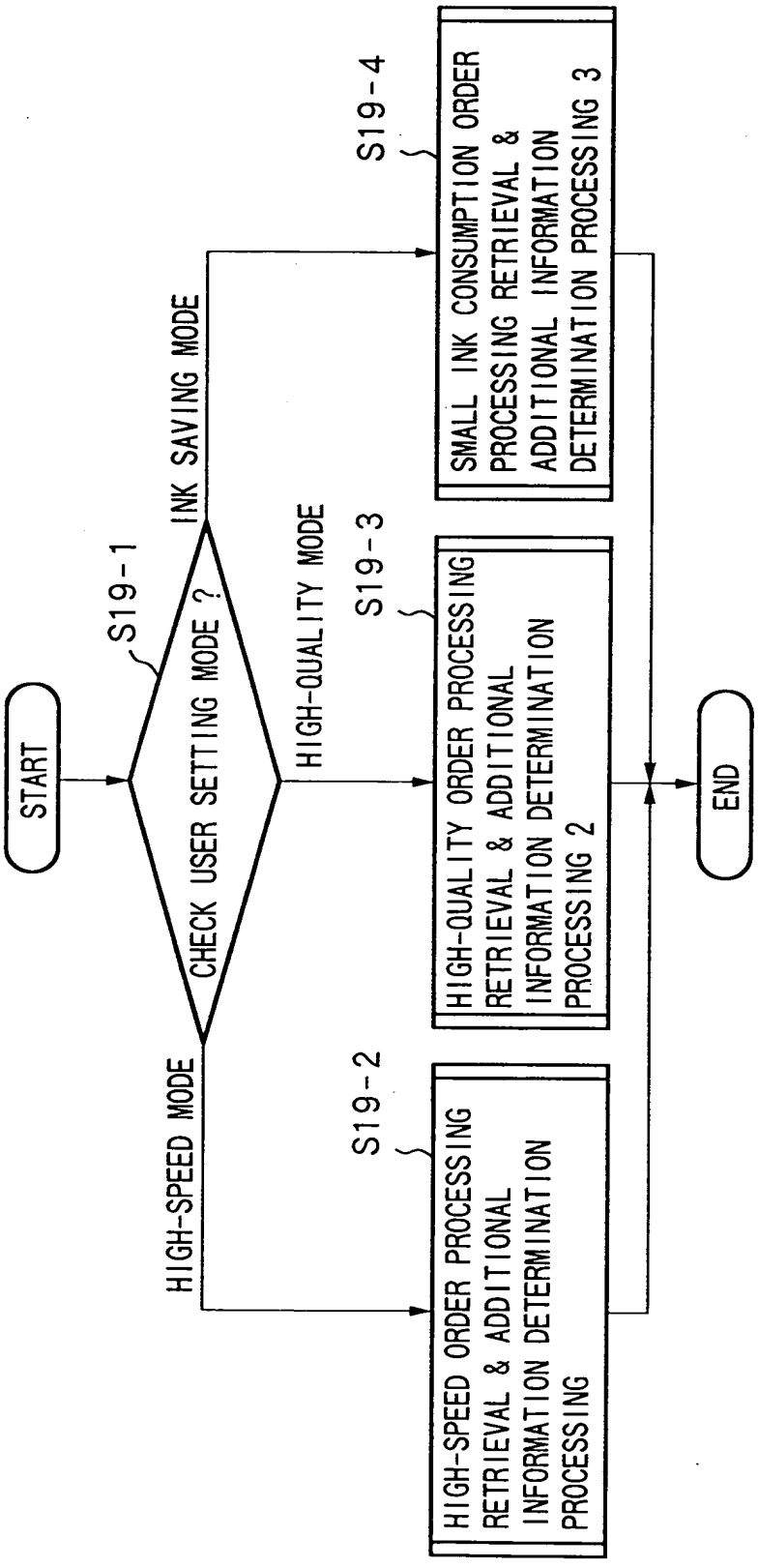

START
S19-1
CHECK USER SETTING MODE ?
INK SAVING MODE
HIGH-QUALITY MODE
HIGH-SPEED MODE
S19-4
SMALL INK CONSUMPTION ORDER PROCESSING RETRIEVAL & ADDITIONAL INFORMATION DETERMINATION PROCESSING 3
S19-3
HIGH-QUALITY ORDER PROCESSING RETRIEVAL & ADDITIONAL INFORMATION DETERMINATION PROCESSING 2
S19-2
HIGH-SPEED ORDER PROCESSING RETRIEVAL & ADDITIONAL INFORMATION DETERMINATION PROCESSING
END

FIG.9

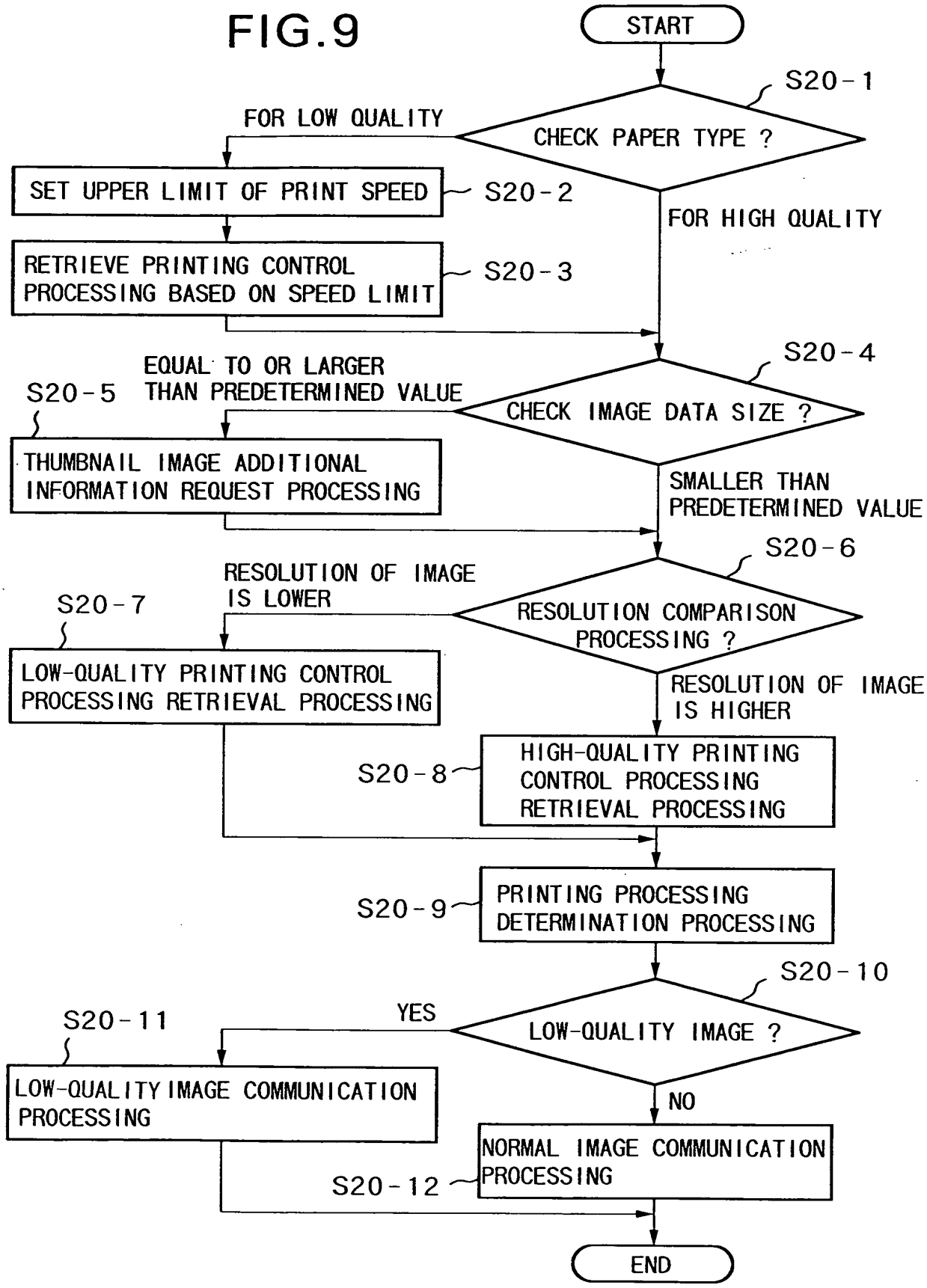

START
S20-1
CHECK PAPER TYPE ?
FOR LOW QUALITY
SET UPPER LIMIT OF PRINT SPEED
S20-2
RETRIEVE PRINTING CONTROL PROCESSING BASED ON SPEED LIMIT
S20-3
FOR HIGH QUALITY
S20-4
CHECK IMAGE DATA SIZE ?
EQUAL TO OR LARGER THAN PREDETERMINED VALUE
S20-5
THUMBNAIL IMAGE ADDITIONAL INFORMATION REQUEST PROCESSING
SMALLER THAN PREDETERMINED VALUE
S20-6
RESOLUTION COMPARISON PROCESSING ?
RESOLUTION OF IMAGE IS LOWER
S20-7
LOW-QUALITY PRINTING CONTROL PROCESSING RETRIEVAL PROCESSING
RESOLUTION OF IMAGE IS HIGHER
S20-8
HIGH-QUALITY PRINTING CONTROL PROCESSING RETRIEVAL PROCESSING
S20-9
PRINTING PROCESSING DETERMINATION PROCESSING
S20-10
LOW-QUALITY IMAGE ?
YES
S20-11
LOW-QUALITY IMAGE COMMUNICATION PROCESSING
NO
NORMAL IMAGE COMMUNICATION PROCESSING
S20-12
END

FIG.10

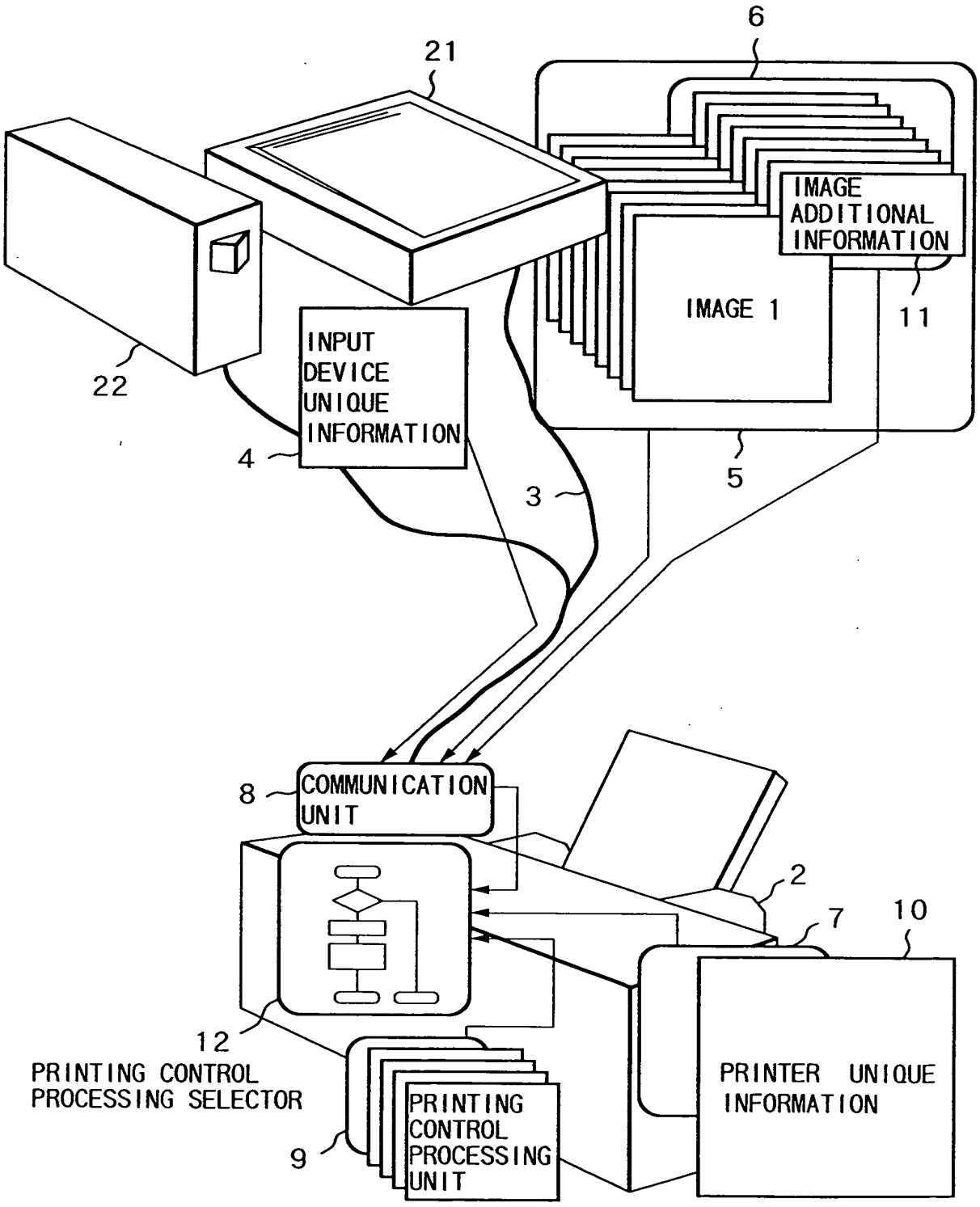

6
21
IMAGE ADDITIONAL INFORMATION
IMAGE 1
11
22
INPUT DEVICE UNIQUE INFORMATION
4
3
5
8
COMMUNICATION UNIT
2
7
10
12
PRINTING CONTROL PROCESSING SELECTOR
PRINTING CONTROL PROCESSING UNIT
9
PRINTER UNIQUE INFORMATION

FIG.11

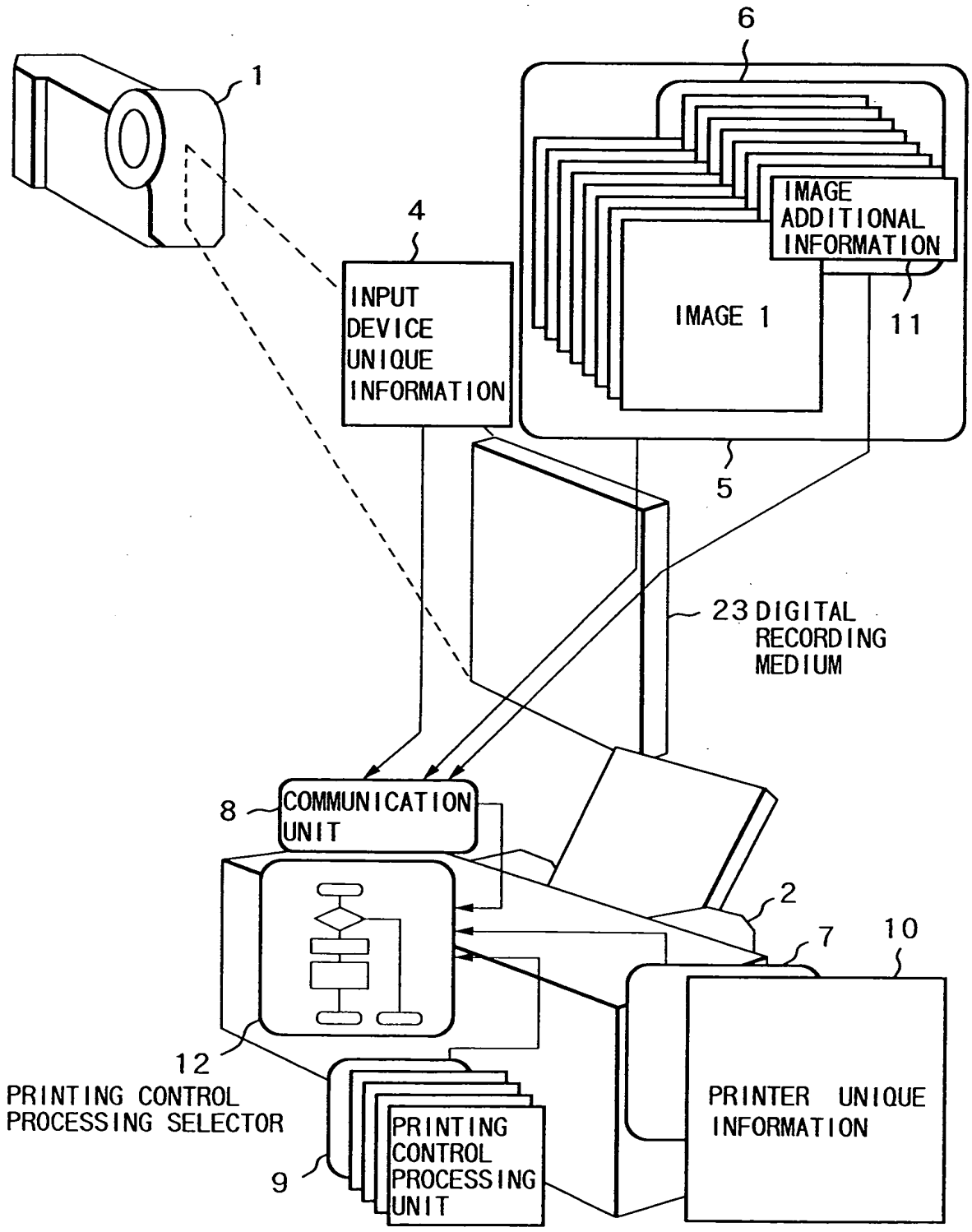

6
1
IMAGE ADDITIONAL INFORMATION
4
INPUT DEVICE UNIQUE INFORMATION
IMAGE 1
11
5
23 DIGITAL RECORDING MEDIUM
8
COMMUNICATION UNIT
2
7
10
12
PRINTING CONTROL PROCESSING SELECTOR
PRINTER UNIQUE INFORMATION
9
PRINTING CONTROL PROCESSING UNIT

FIG.12

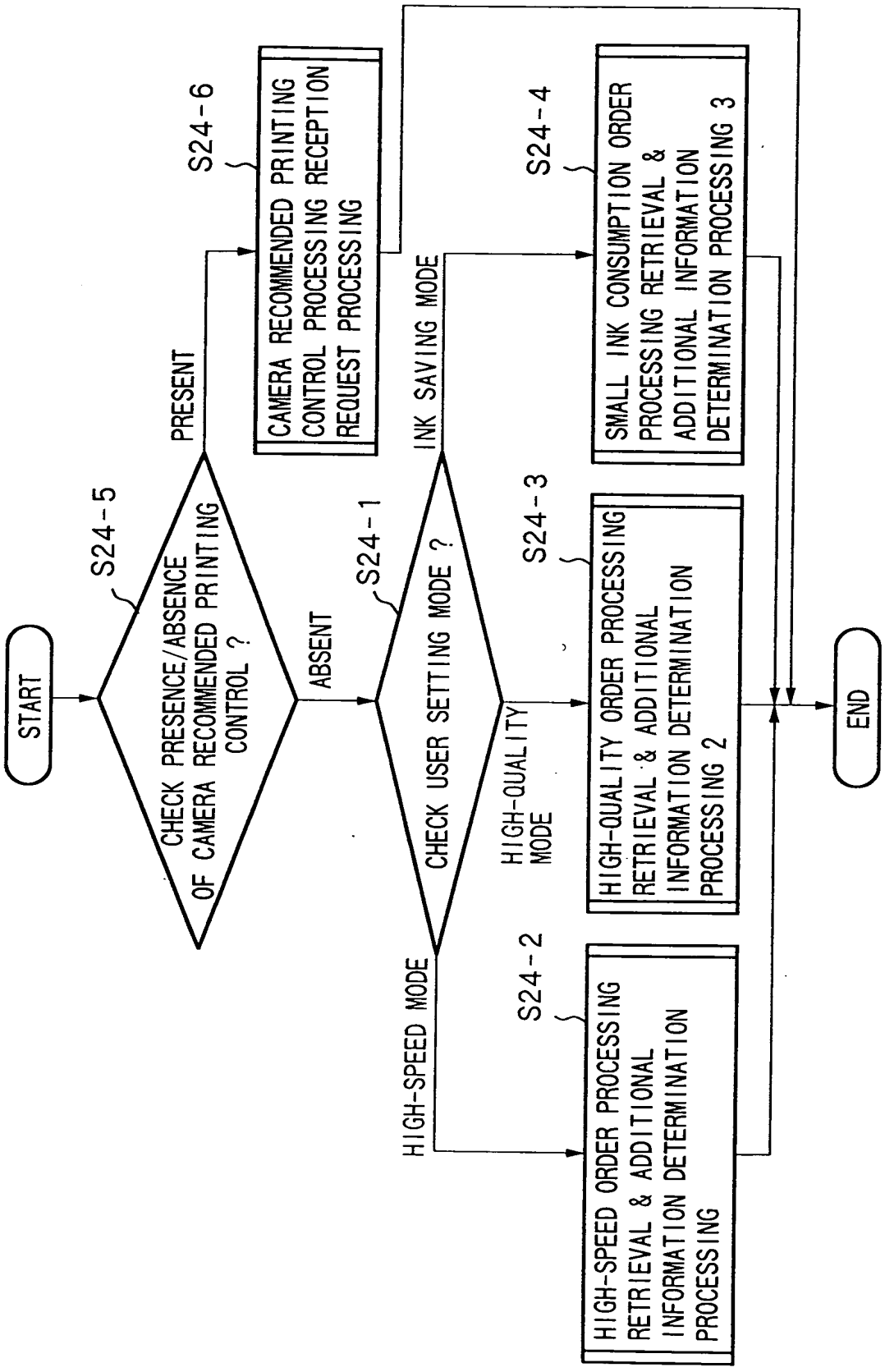

START
S24-5
CHECK PRESENCE/ABSENCE OF CAMERA RECOMMENDED PRINTING CONTROL ?
PRESENT
S24-6
CAMERA RECOMMENDED PRINTING CONTROL PROCESSING RECEPTION REQUEST PROCESSING
ABSENT
S24-1
CHECK USER SETTING MODE ?
INK SAVING MODE
S24-4
SMALL INK CONSUMPTION ORDER PROCESSING RETRIEVAL & ADDITIONAL INFORMATION DETERMINATION PROCESSING 3
HIGH-QUALITY MODE
S24-3
HIGH-QUALITY ORDER PROCESSING RETRIEVAL & ADDITIONAL INFORMATION DETERMINATION PROCESSING 2
HIGH-SPEED MODE
S24-2
HIGH-SPEED ORDER PROCESSING RETRIEVAL & ADDITIONAL INFORMATION DETERMINATION PROCESSING
END

FIG.13

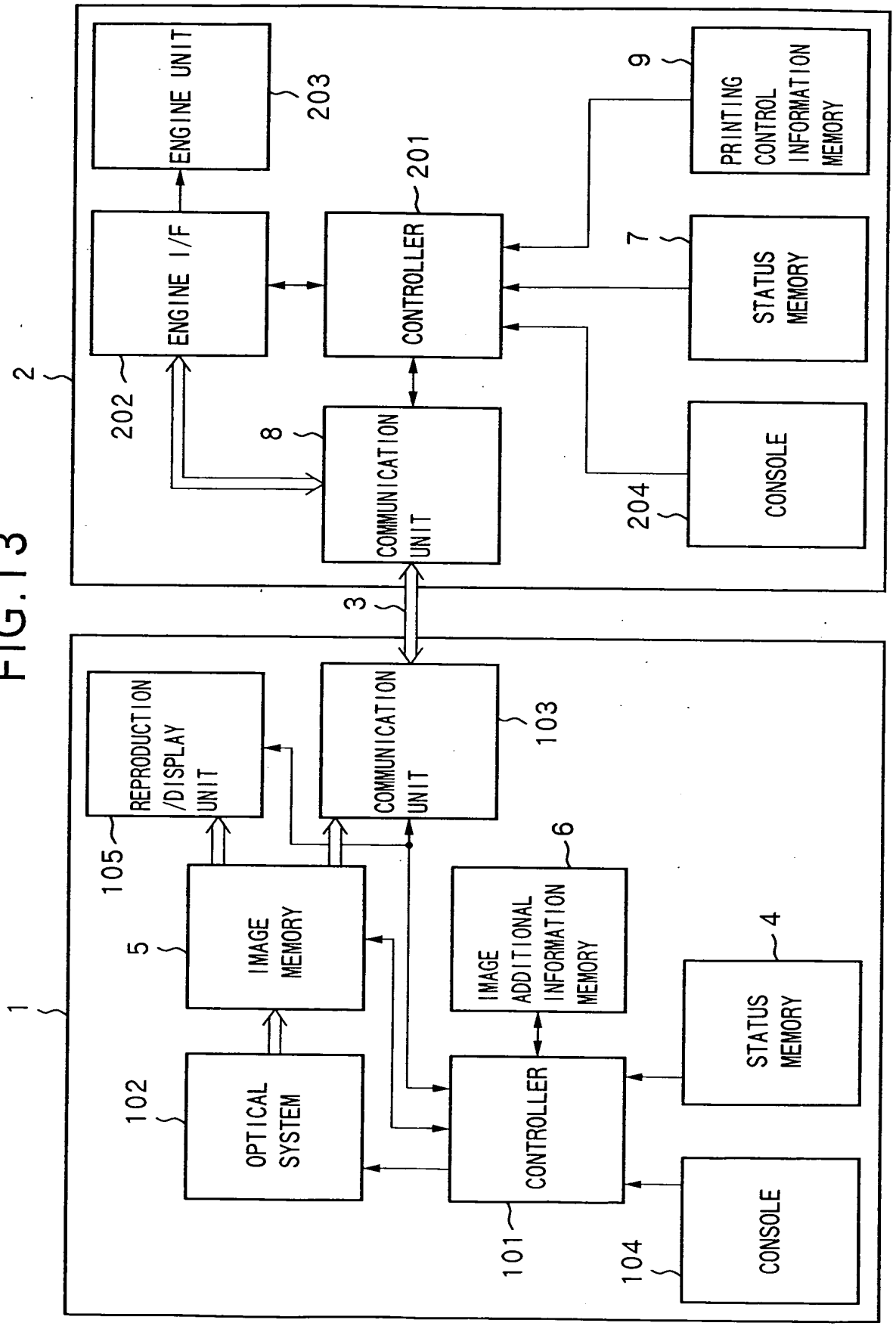

1
2
3
ENGINE UNIT
203
ENGINE I/F
202
CONTROLLER
201
PRINTING CONTROL INFORMATION MEMORY
9
STATUS MEMORY
7
COMMUNICATION UNIT
8
CONSOLE
204
REPRODUCTION /DISPLAY UNIT
105
COMMUNICATION UNIT
103
IMAGE MEMORY
5
IMAGE ADDITIONAL INFORMATION MEMORY
6
OPTICAL SYSTEM
102
CONTROLLER
101
STATUS MEMORY
4
CONSOLE
104

FIG.14

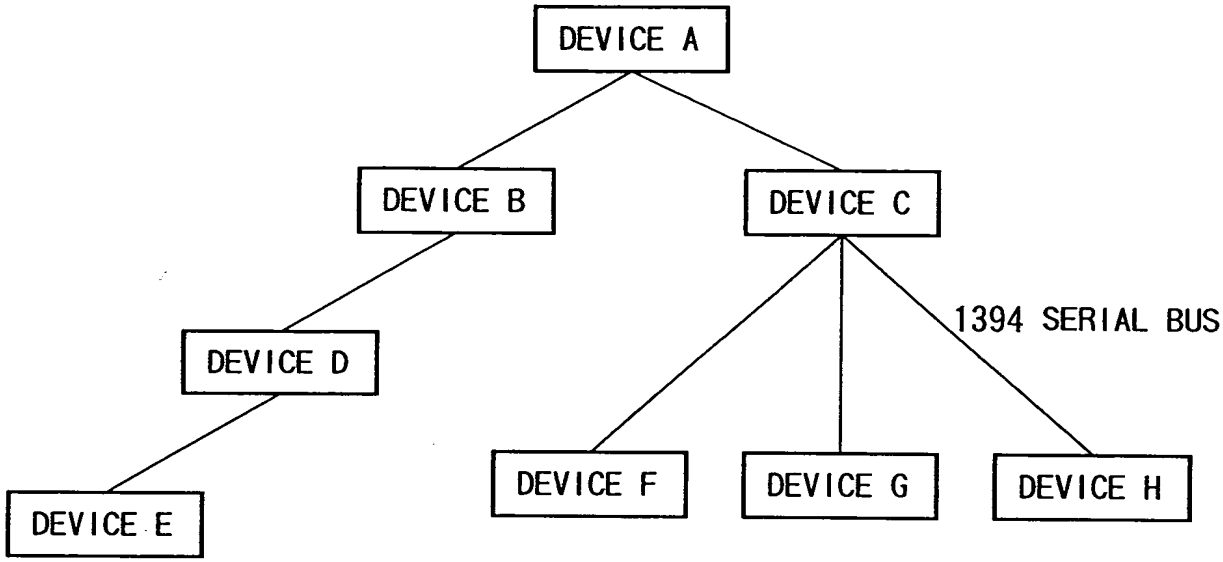

DEVICE A
DEVICE B
DEVICE C
DEVICE D
DEVICE E
DEVICE F
DEVICE G
DEVICE H
1394 SERIAL BUS

FIG.15

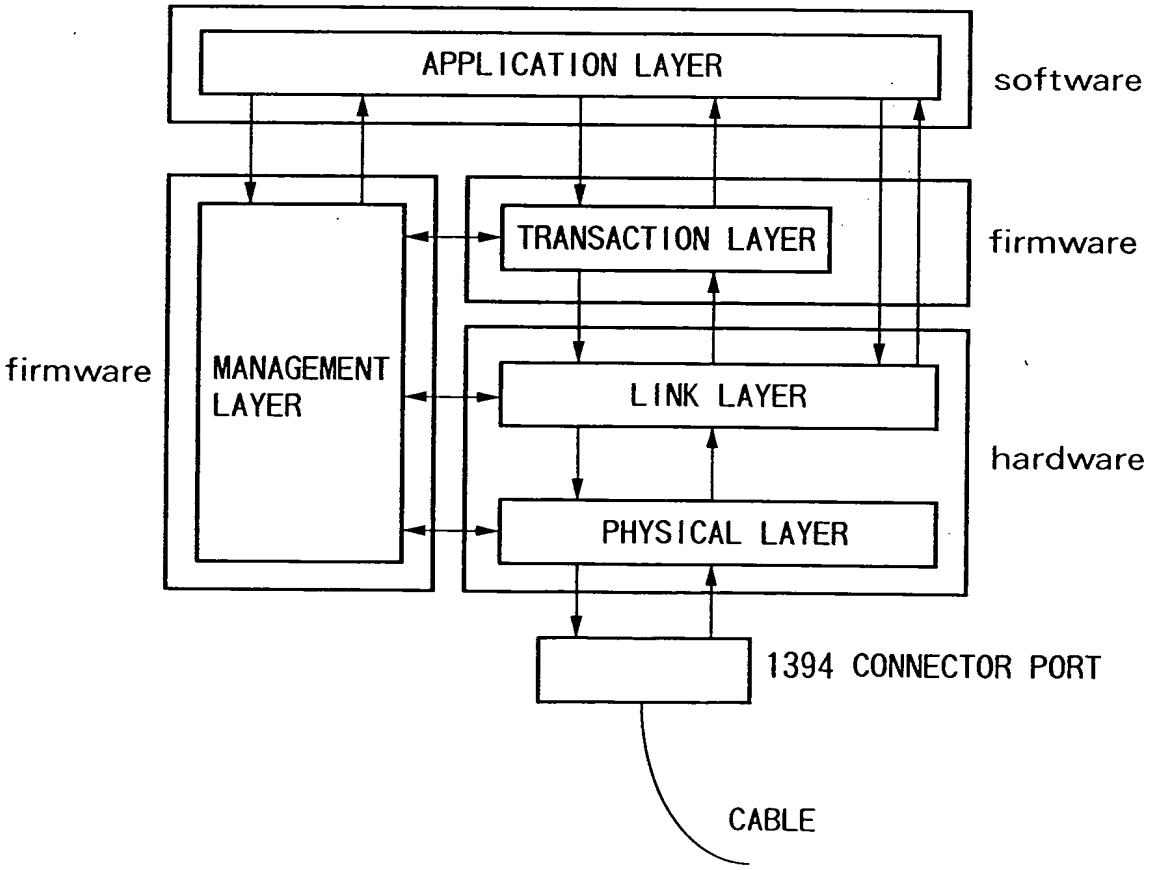

APPLICATION LAYER
software
TRANSACTION LAYER
firmware
firmware
MANAGEMENT LAYER
LINK LAYER
hardware
PHYSICAL LAYER
1394 CONNECTOR PORT
CABLE

FIG.16

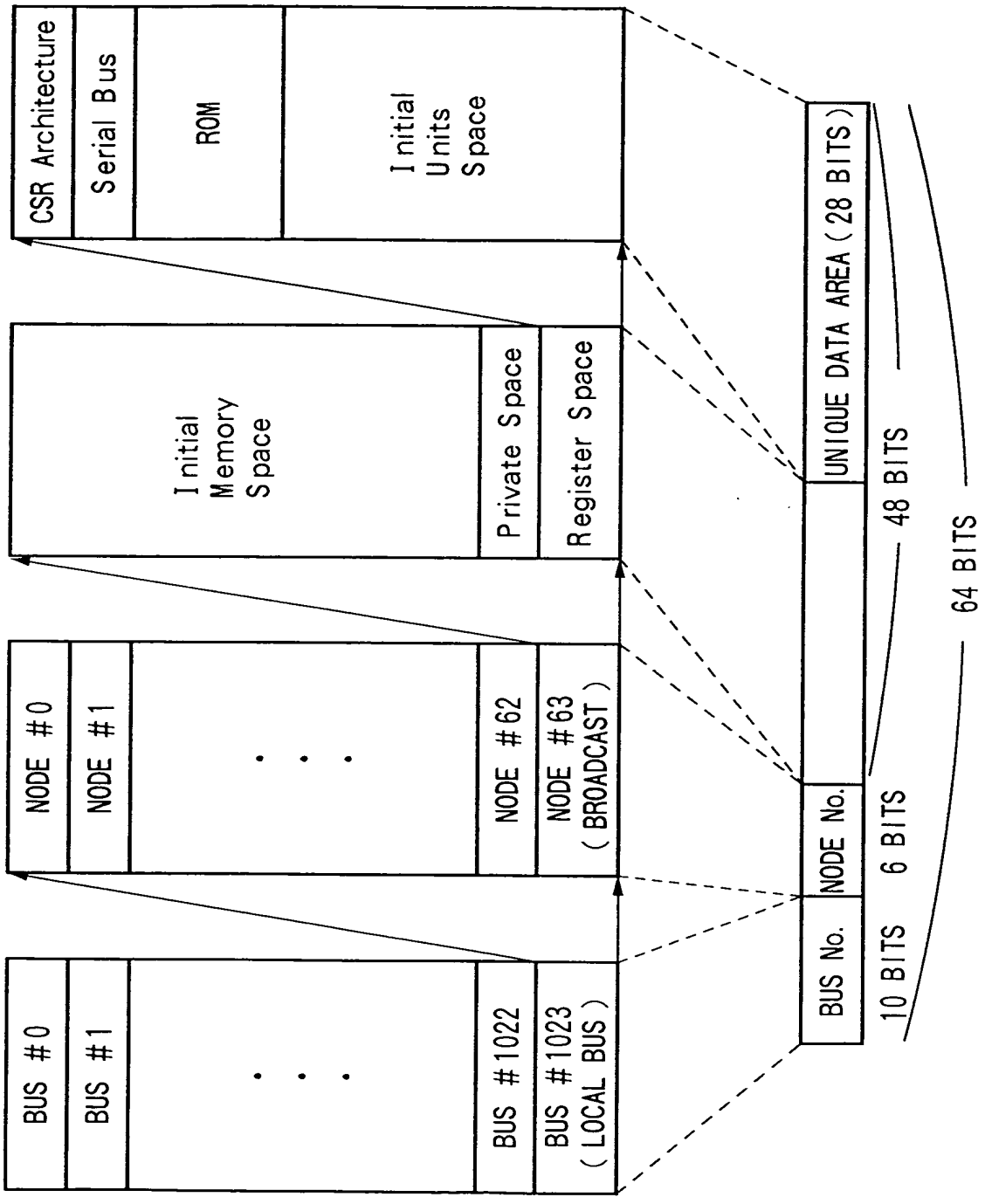

CSR Architecture
Serial Bus
ROM
Initial Units Space
Initial Memory Space
Private Space
Register Space
NODE #0
NODE #1
NODE #62
NODE #63 (BROADCAST)
BUS #0
BUS #1
BUS #1022
BUS #1023 (LOCAL BUS)
UNIQUE DATA AREA (28 BITS)
BUS No.
NODE No.
10 BITS
6 BITS
48 BITS
64 BITS

FIG.17

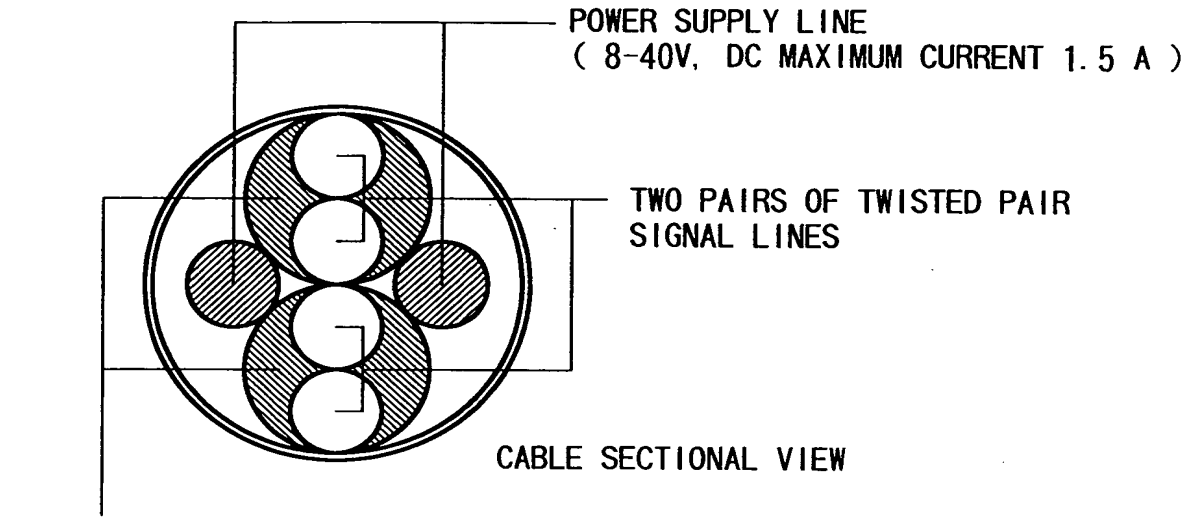
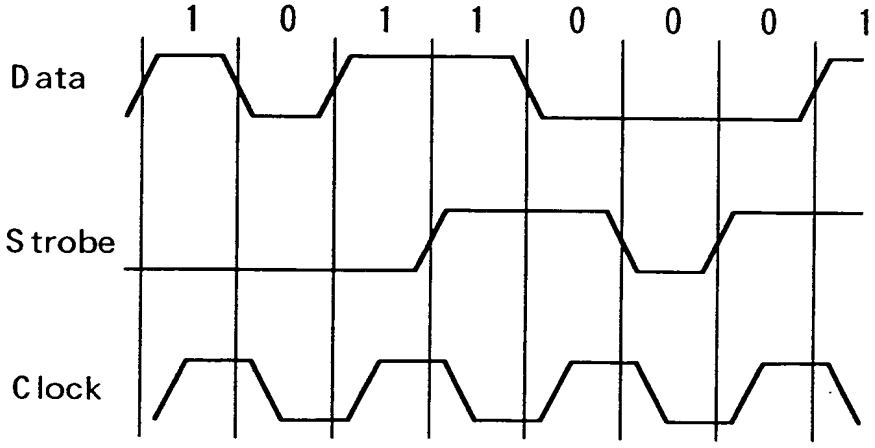
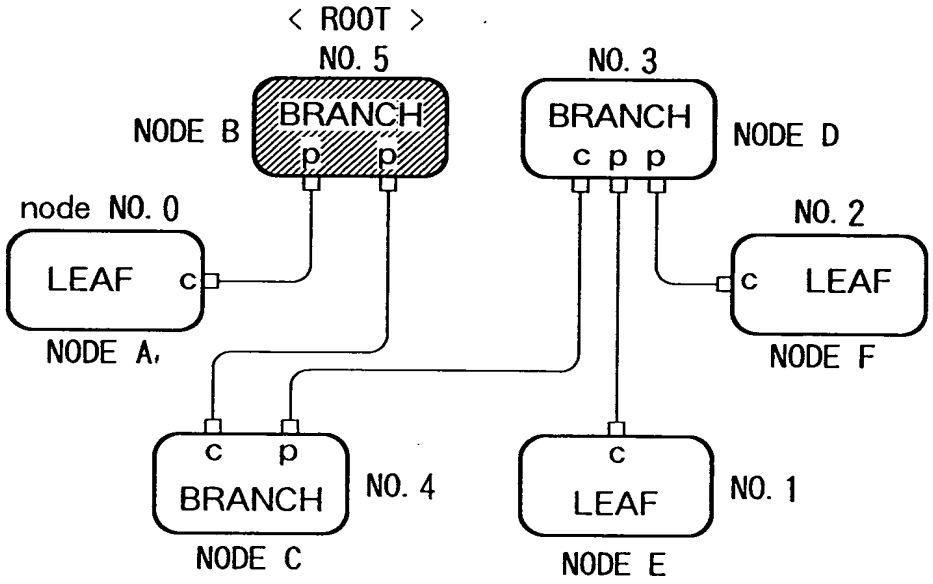


FIG.18



EX-OR SIGNAL BETWEEN Data AND Strobe

FIG.19



BRANCH: NODE HAVING TWO OR MORE NODE CONNECTIONS
LEAF: NODE HAVING ONLY ONE NODE CONNECTION
□: PORT
c: PORT CORRESPONDING TO CHILD NODE
p: PORT CORRESPONDING TO PARENT NODE

FIG.20A

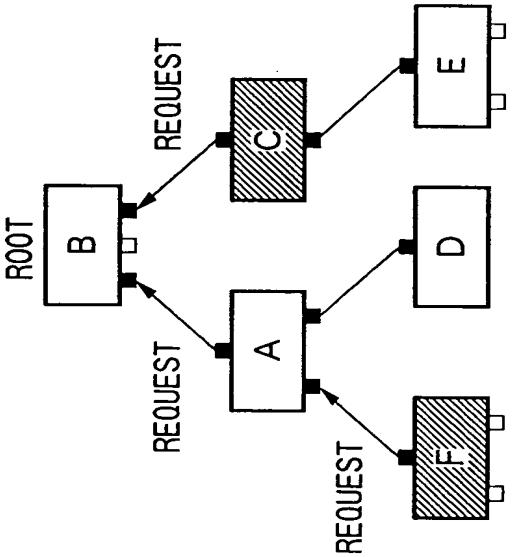


FIG.20B

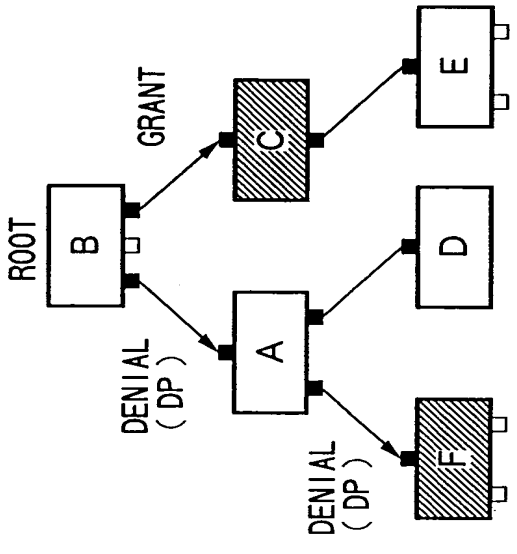


FIG.21

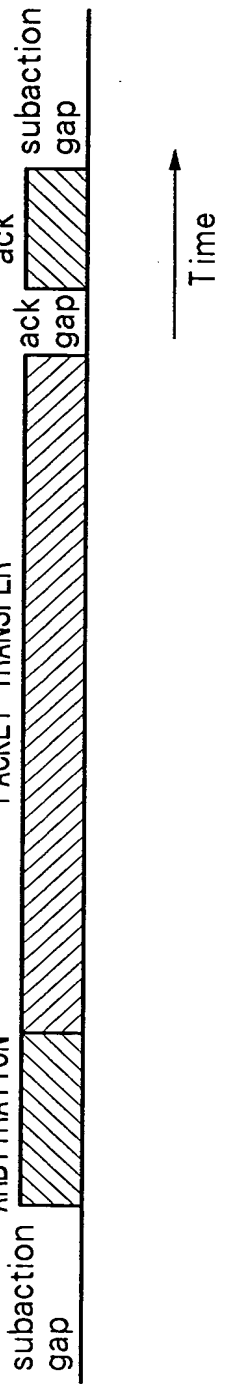

subaction gap
ARBITRATION
PACKET TRANSFER
ack gap
ack
subaction gap
Time

FIG.22

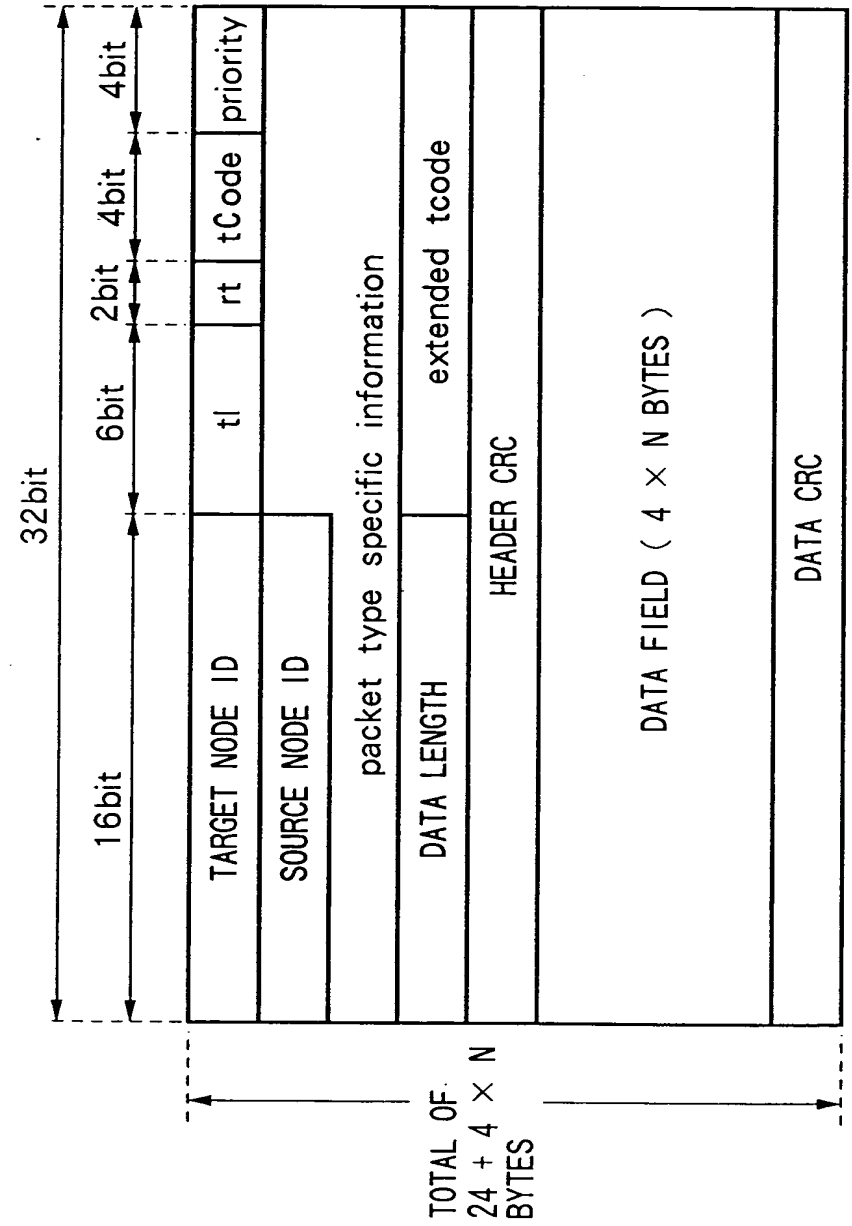

32bit
16bit
6bit
2bit
4bit
4bit
TARGET NODE ID
tl
rt
tCode
priority
SOURCE NODE ID
packet type specific information
DATA LENGTH
extended tcode
HEADER CRC
DATA FIELD (4 × N BYTES)
DATA CRC
TOTAL OF 24 + 4 × N BYTES

FIG.23

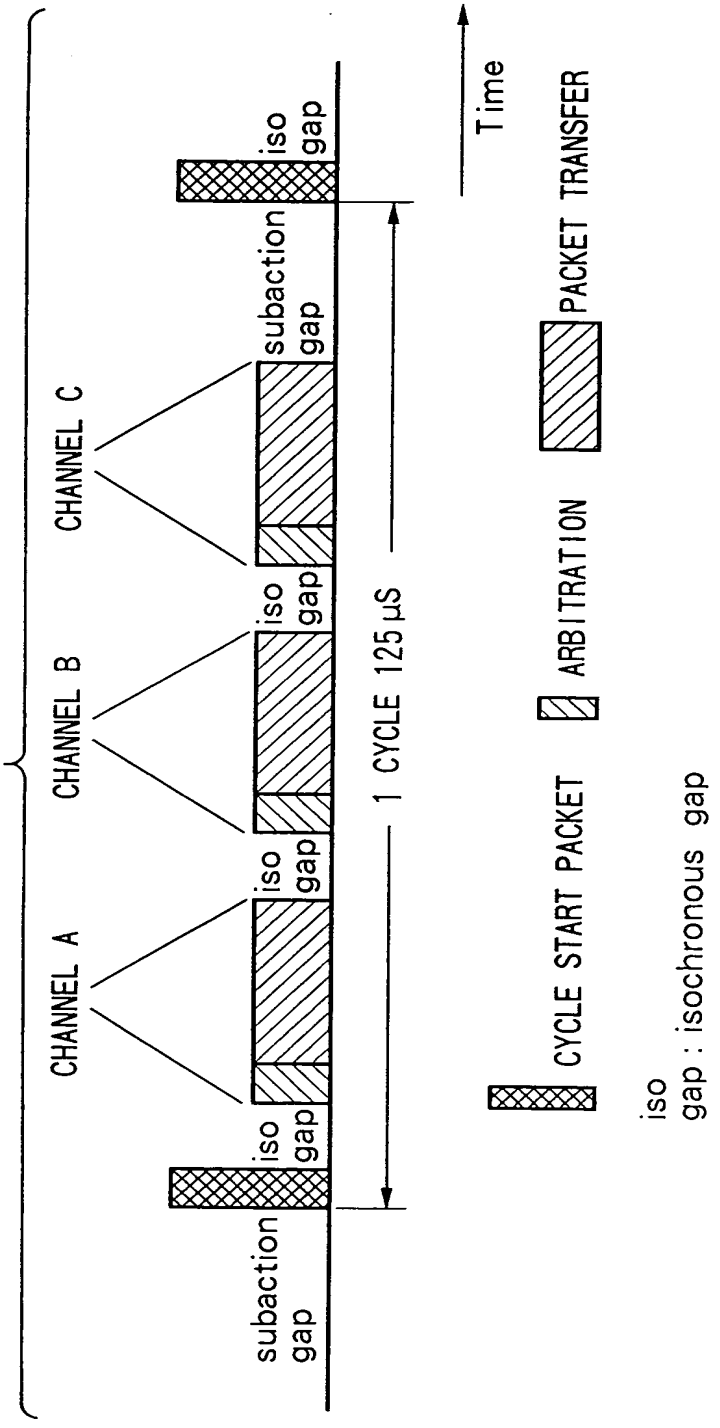

CHANNEL A
CHANNEL B
CHANNEL C
subaction gap
iso gap
1 CYCLE 125 μS
Time
CYCLE START PACKET
ARBITRATION
PACKET TRANSFER
iso
gap : isochronous gap

FIG.24

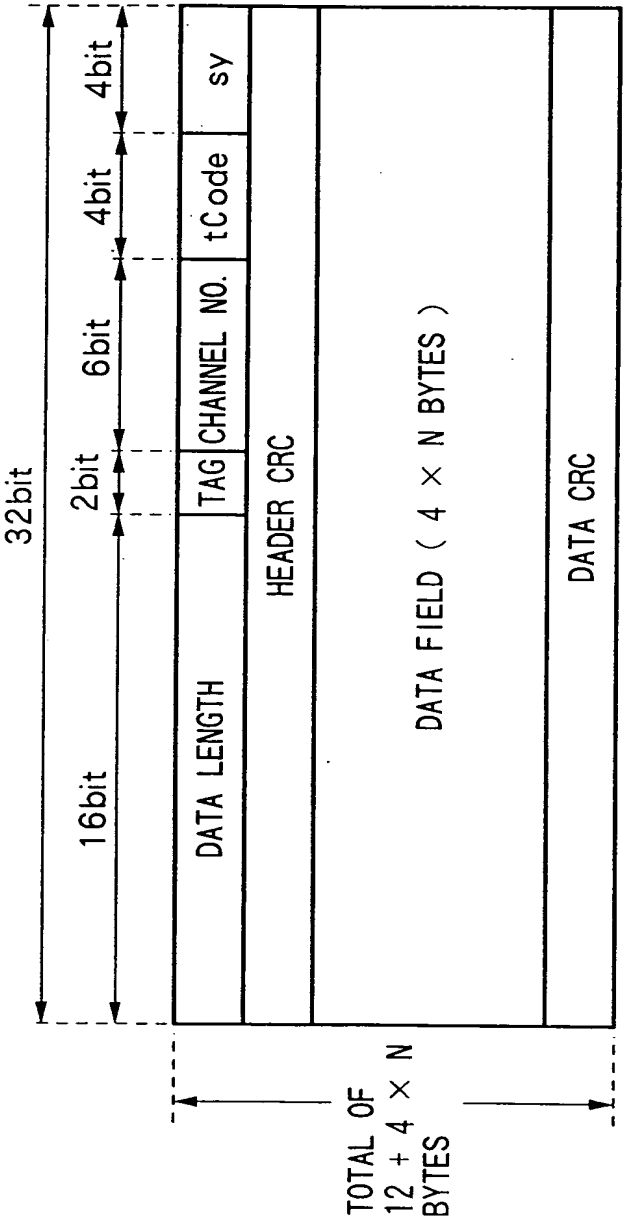

32bit
16bit
2bit
6bit
4bit
4bit
4bit
DATA LENGTH
TAG
CHANNEL NO.
tCode
sy
HEADER CRC
DATA FIELD (4 × N BYTES)
DATA CRC
TOTAL OF
12 + 4 × N
BYTES

FIG.25

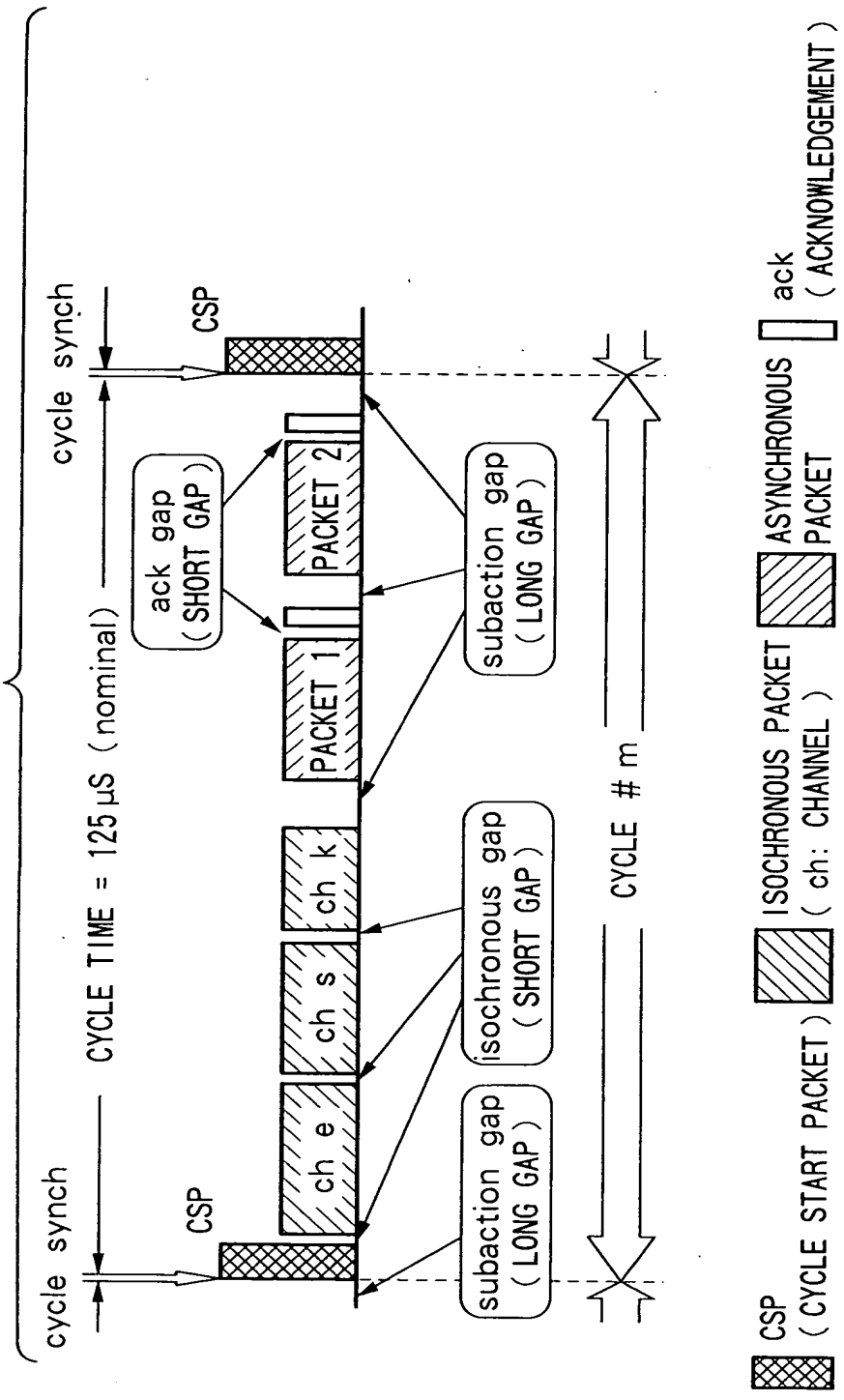

cycle synch
CYCLE TIME = 125 μS (nominal)
cycle synch
CSP
ack gap
(SHORT GAP)
PACKET 2
PACKET 1
ch k
ch s
ch e
subaction gap
(LONG GAP)
isochronous gap
(SHORT GAP)
subaction gap
(LONG GAP)
CSP
CYCLE # m
CSP
(CYCLE START PACKET)
ISOCHRONOUS PACKET
(ch: CHANNEL)
ASYNCHRONOUS
PACKET
ack
(ACKNOWLEDGEMENT)

FIG.26

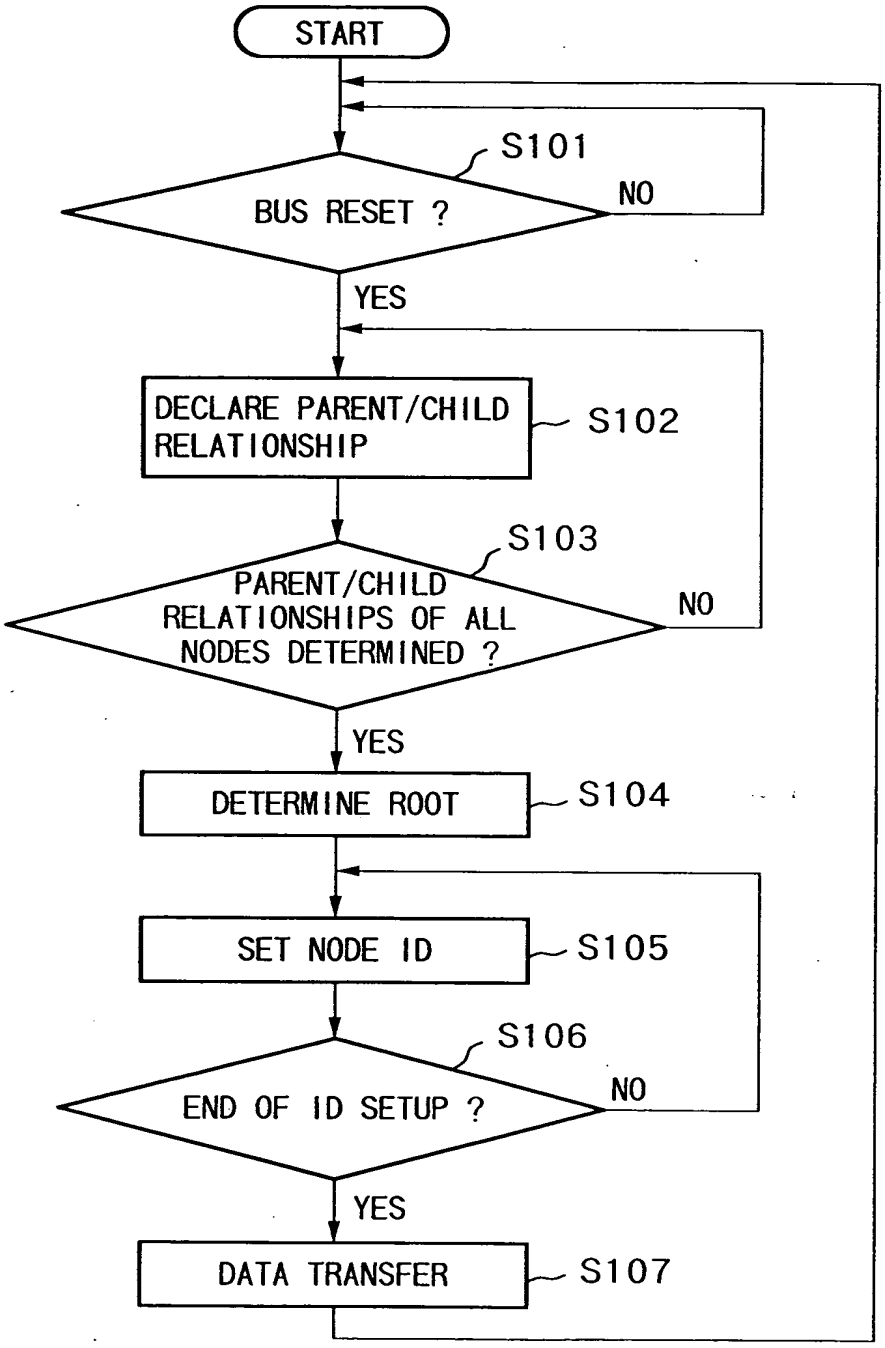

START
S101
BUS RESET ?
NO
YES
DECLARE PARENT/CHILD RELATIONSHIP
S102
S103
PARENT/CHILD RELATIONSHIPS OF ALL NODES DETERMINED ?
NO
YES
DETERMINE ROOT
S104
SET NODE ID
S105
S106
END OF ID SETUP ?
NO
YES
DATA TRANSFER
S107

FIG.27

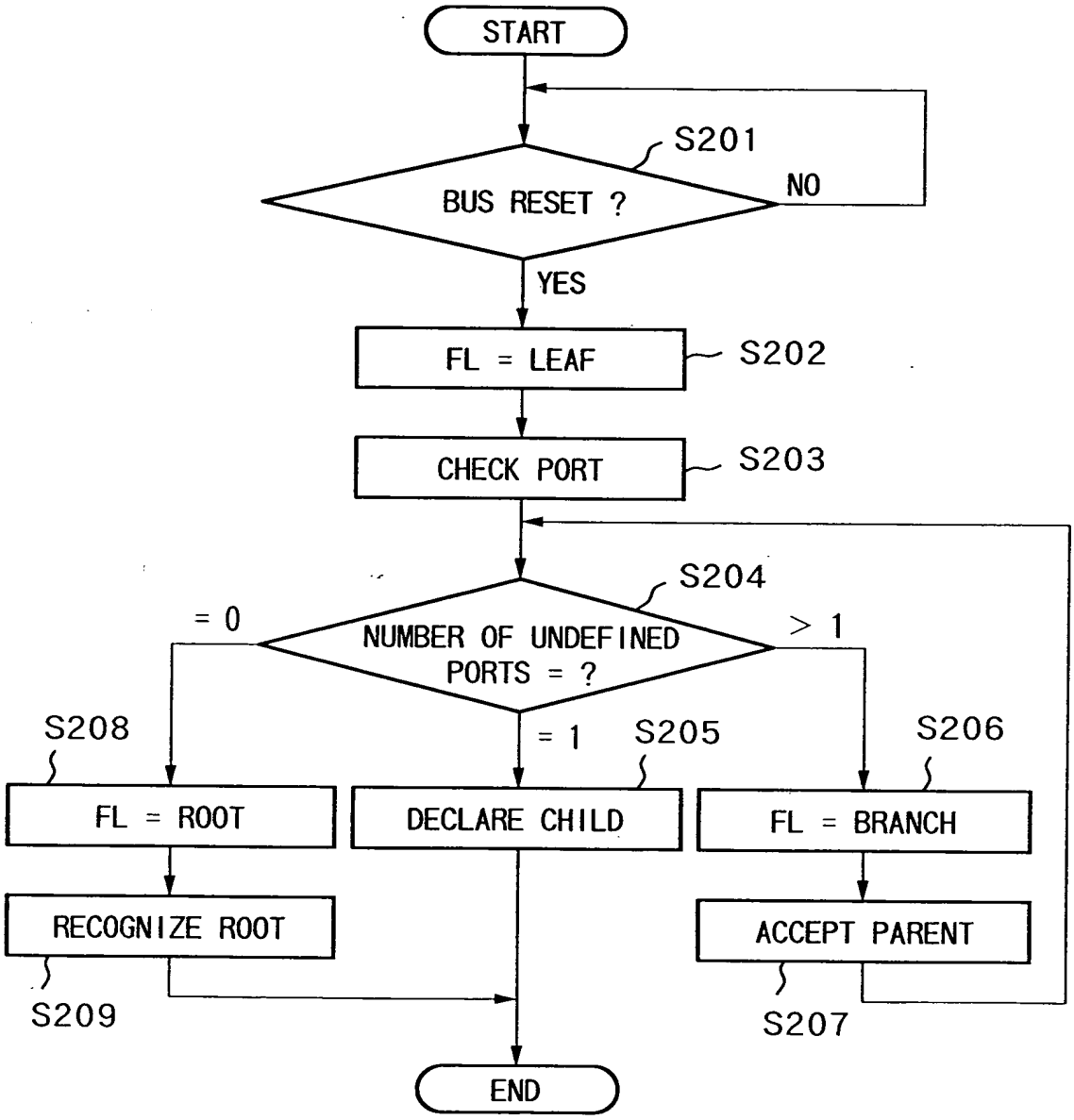

START
S201
BUS RESET ?
NO
YES
FL = LEAF
S202
CHECK PORT
S203
S204
NUMBER OF UNDEFINED PORTS = ?
= 0
= 1
> 1
S208
S205
S206
FL = ROOT
DECLARE CHILD
FL = BRANCH
RECOGNIZE ROOT
ACCEPT PARENT
S209
S207
END

FIG.28

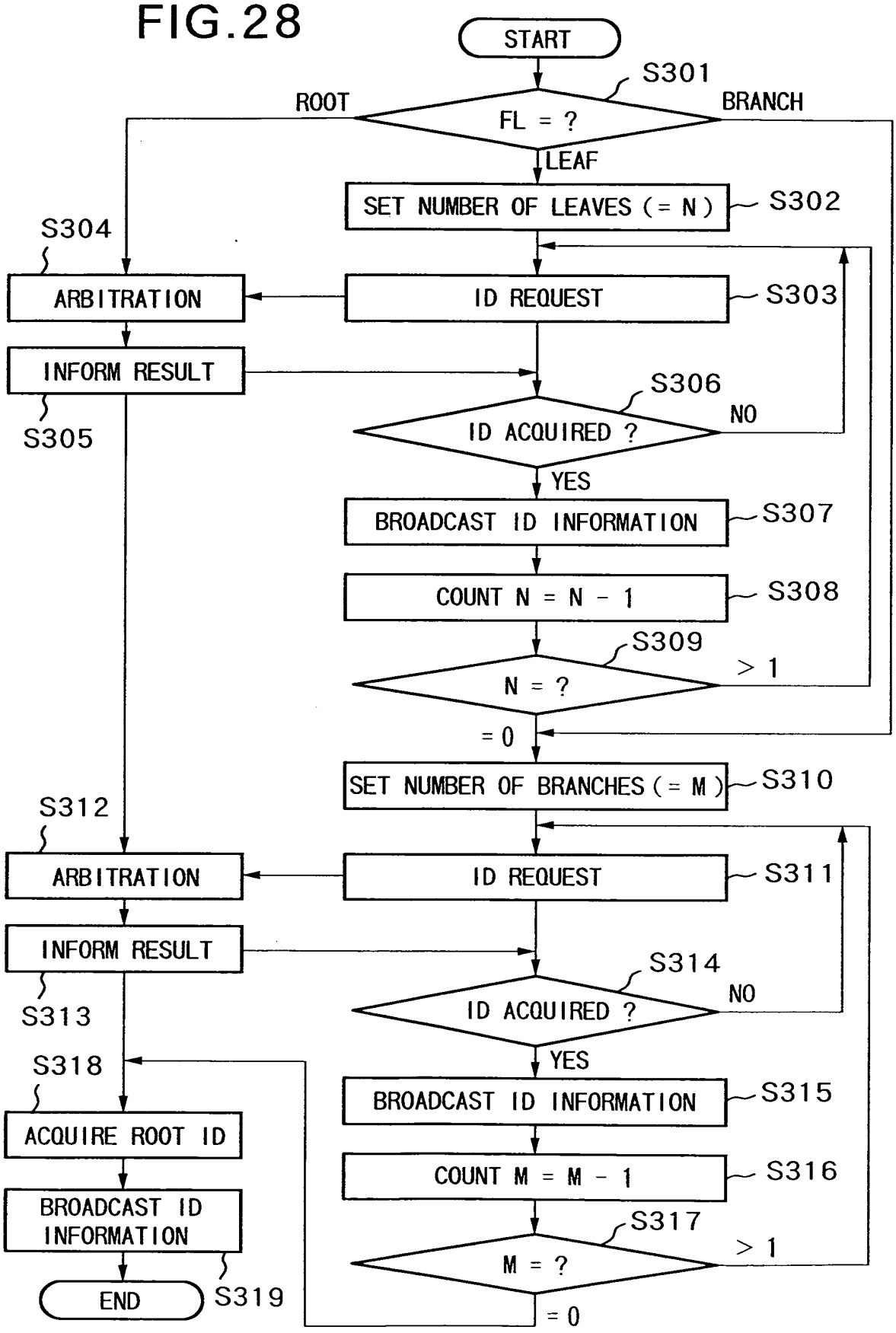
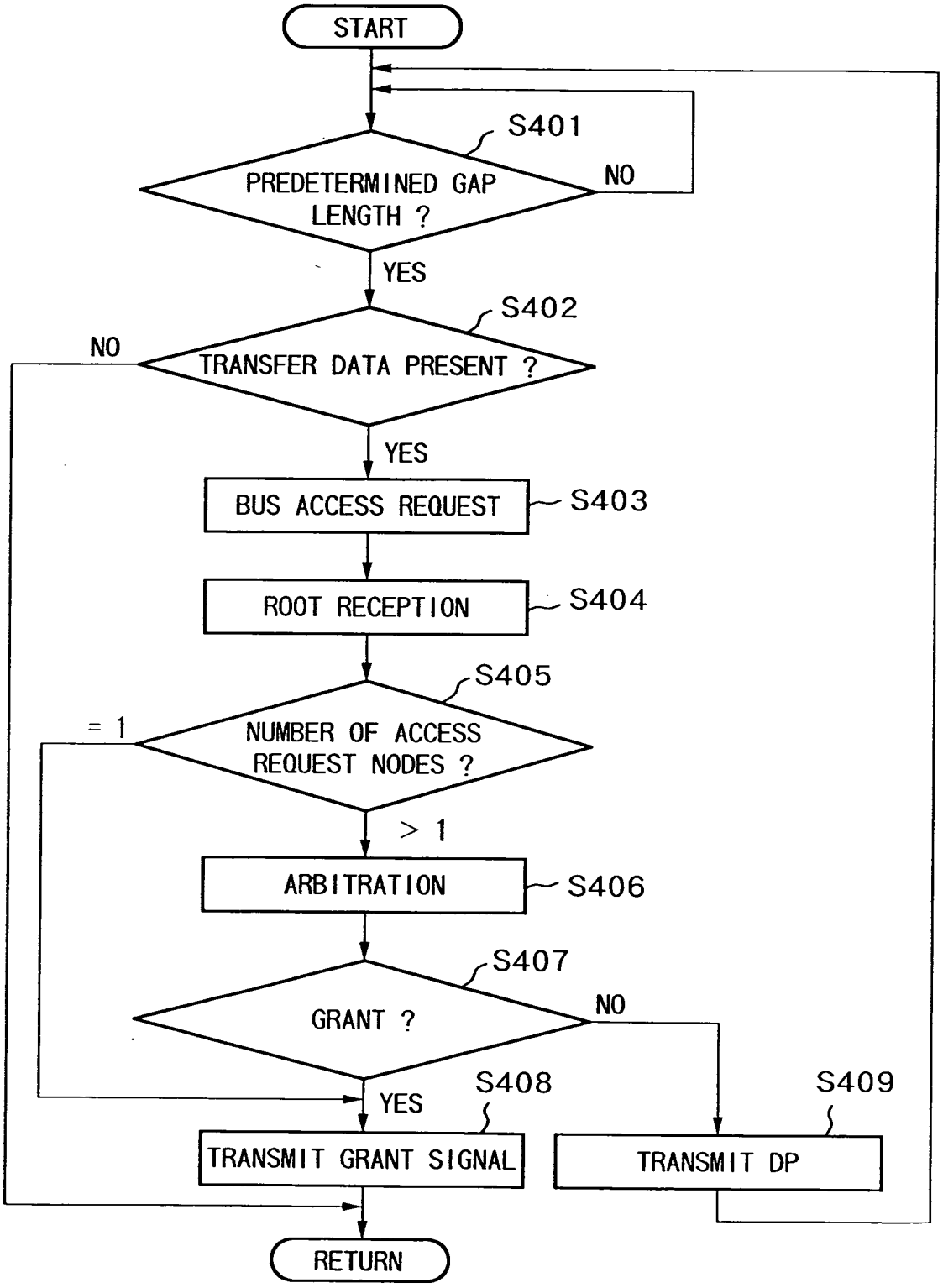

START
S301
FL = ?
ROOT
BRANCH
LEAF
SET NUMBER OF LEAVES (= N)
S302
S304
ARBITRATION
ID REQUEST
S303
INFORM RESULT
S305
S306
ID ACQUIRED ?
NO
YES
BROADCAST ID INFORMATION
S307
COUNT N = N - 1
S308
S309
N = ?
> 1
= 0
SET NUMBER OF BRANCHES (= M)
S310
S312
ARBITRATION
ID REQUEST
S311
INFORM RESULT
S313
S314
ID ACQUIRED ?
NO
YES
S318
BROADCAST ID INFORMATION
S315
ACQUIRE ROOT ID
COUNT M = M - 1
S316
BROADCAST ID INFORMATION
S317
M = ?
> 1
END
S319
= 0

FIG.29


START
S401
PREDETERMINED GAP LENGTH ?
NO
YES
S402
NO
TRANSFER DATA PRESENT ?
YES
BUS ACCESS REQUEST
S403
ROOT RECEPTION
S404
S405
= 1
NUMBER OF ACCESS REQUEST NODES ?
> 1
ARBITRATION
S406
S407
GRANT ?
NO
S408
YES
TRANSMIT GRANT SIGNAL
S409
TRANSMIT DP
RETURN